VOLUME XXXIX NUMBER 6 WHOLE NUMBER 345

THE JOURNAL
OF
THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

DEVOTED TO THE ADVANCEMENT OF ASTRONOMY AND ALLIED SCIENCES

EDITOR, C. A. CHANT ASSISTANT EDITOR, F. S. HOGG

David Dunlap Observatory
Richmond Hill P.O., Ont.

ASSOCIATE EDITORS:

R. MELDRUM STEWART
Dominion Astronomer
Ottawa

J. A. PEARCE
Head Astronomer
Dominion Astrophysical Observatory
Victoria, B.C.

J. PATTERSON
Controller of the Meteorological Service of Canada, Toronto

PUBLISHED MONTHLY
(*Ten numbers per year*)

July-August, 1945

PRINTED FOR THE SOCIETY
TORONTO: 198 COLLEGE ST.

THE JOURNAL
OF
THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

VOL. XXXIX, No. 6 JULY-AUGUST, 1945 WHOLE No. 345

Articles PAGE

One World Calendar for One World ..... *Elisabeth Achelis* 201
Logan's Fault ..... *F. J. Alcock* 213
"Arcturus" ..... *J. Edgar Guimont* 217
Her Majesty's Magnetical and Meteorological Observatory, Toronto, (continued from page 472, vol. 36, Dec. 1942) ..... *A. D. Thiessen* 221

Notes and Queries

Aluminizing Mirrors for Amateurs (*F.S.H.*)—Isaac Barrow and Isaac Newton (*C.A.C.*)—A Brilliant Meteor in New Zealand (*C.A.C.*)—Retirement of G. A. Van Biesbroeck (*C.A.C.*)—Personals (*C.A.C.*)—A Great Reader (*C.A.C.*) 231

Meetings of the Society

At Toronto—At Montreal 236

Upon request, made previous to publication of article, contributors will be supplied free with twenty-five copies of the sheets containing the article attached to a printed cover.

Extra copies about as follows:

	4 pp.	8 pp.	12 pp.	16 pp.	20 pp.	24 pp.
50 copies....	$3 50	$5 50	$9 50	$10 00	$13 00	$16 00
100 copies....	4 00	7 00	10 00	11 00	14 00	18 00
200 copies....	4 50	8 00	11 00	12 00	15 50	20 00

Covers, extra, 50 copies, $1.50; 100 copies, $2.00; 200 copies, $2.50.

Address of Editors: David Dunlap Observatory, Richmond Hill, Ont.

Business correspondence, remittances, etc., should be addressed to J. H. Horning, Treasurer of the Society, 198 College Street, Toronto 2B, Ontario.

$2.00 per annum. Single numbers, 25 cents.

Subscription to the JOURNAL is included in membership fee.

CANADIAN WAR SALVAGE ITEMS FOR TELESCOPE MAKERS.—Achromatic binocular objective and eyepiece lenses; Binocular prisms, Porro prisms, Dove prisms; Plano-convex and double-convex eyepiece lenses; Aluminized diagonal mirrors, mirror-making kits; Telescope parts, diagonal mountings, diagonal eyepiece; Adaptors, eyepieces, etc., made to order; would be pleased to assist amateurs in designing and building their own telescopes.

W. T. PATTERSON, 103 Wyndham St., Guelph, Ont.

PRINTED IN CANADA

THE JOURNAL

OF

THE ROYAL ASTRONOMICAL SOCIETY
OF CANADA

VOL. XXXIX, No. 6 JULY-AUGUST, 1945 WHOLE No. 345

ONE WORLD CALENDAR FOR ONE WORLD*

By ELISABETH ACHELIS

AGAIN I am honored and privileged to return to Canada and address other Centres of the Royal Astronomical Society. I am beginning to feel quite at home in your country because of the warm friendship with which your Society has welcomed me a year ago and again tonight.

Nations and peoples are recognizing that our planet Earth is one entity—one world, rather than divided or isolated, one section from another. Slowly but surely, we are seeing barriers between nations razed and differences and prejudices giving way to greater understanding. We are observing that whatever event or condition affects one part or section of the Earth affects the whole, and that all these events and conditions are recorded by means of the calendar. Thus the calendar is really a great uniting force and should be recorded under one world system also, for the calendar likewise affects peoples and nations as do events and conditions.

A recent book, *The Treasury of Science*, edited by Harlow Shapley, contains a section on "The Heavens" wherein one reads that "the supreme discovery of science [is] the orderliness of the universe." This is further explained as an orderliness wherein celestial phenomena recur in regular sequences and that the succession of events, although often somewhat complex, is nevertheless systematic and invariable. A majestic order prevails in the heavens.

Now it is a similar orderliness that calendar reformers wish to bring to our present disordered calendar, for they realize that only

*A talk delivered before meetings of the Centres of the R.A.S.C., held in Toronto, Hamilton, London, and Windsor in April 3-8, 1945.

with order and careful planning will civilization and peoples really progress and achieve better results and conditions.

The regular sequence of celestial events in which we are directly concerned is the solar system of which the earth is a part, a small part it is true but very vital to us. The rhythmic and regular order in which the nine planets revolve around the sun, each planet circling around its own axis yet remaining within its own prescribed sphere, is the supreme system of order and harmony known to man. It is divine in concept, divine in achievement, governed by sublime wisdom, supreme intelligence, perfect justice and infinite understanding. Man has ever stood in awe before it, not realizing that he too might fashion his various systems on a similar pattern.

We notice that among the planets, Mercury, the smallest and closest to the sun, takes 88 days (according to our reckoning of time) to complete one trip around the sun. It takes the earth to complete one such trip 365 and a fraction of a day, Jupiter 12 years and the last and most recently discovered planet Pluto, 249 years.

How mathematically complex and different is the length of time it actually takes each planet to finish one full course around the sun yet everything moves in harmony and order. Each planet stays within its own orbit, realizes its own importance, and has its own particular work which no other planet could possibly do. Notwithstanding their distinctive individualities and differences, they all belong to the solar system, are inextricably united and related, indivisible and inseparable parts of the whole system.

In earlier days it was the solar system (in which man also included the stars and the moon) that gave man his first sensation of movement, of progression. It was this steady recurrent celestial motion without beginning or end, that continuous flow of the passing heavenly scene, that awakened in him his first concept of Time. Man began to associate time with the moon and her regular four phases. The moon gave him his first idea of a calendar.

In the gradual process of man's growth and the steady evolution of civilization from the ancient past down to the present and out into the future, there occur certain historical events that profoundly affect the world, compelling man to orient himself anew. He is ever forced to accept a new outlook on life and conditions. He

has to take a bold step forward, willingly allowing the past to rest with the past, in order to progress.

One such notable and far-reaching event was the courageous act of the ancient Egyptians when they discovered that the sun influenced the seasonal year. Deliberately and unequivocably they discarded the moon for the sun as the basis of calendar reckoning. By accepting the longer time-period of the seasonal year, the Egyptians advanced to greater progress which would not have been possible had they retained the moon calendar. Speaking astronomically, this seasonal solar calendar, adopted a *mere* six to seven thousand years ago, was the basis of the succeeding Julian and now of our present Gregorian calendar.

Another epoch-making event centuries later was the discovery made by Copernicus and nobly supported by Galileo that the earth was neither flat nor the center of the universe but a rotating sphere revolving around the sun.

But how much more evolutionary is the present World War wherein everything is undergoing change and new concepts are beckoning us all onward! It is compelling man everywhere to take on a new outlook on life in its many phases and conditions. Nothing remains untouched and unchanged, and happy are those who, understanding, are flowing with this tremendous tide that seeks to purge the earth from old ills and obsessions.

Among the inevitable new conditions is the perpetual World Calendar of twelve months and equal quarters which, with its one or two new World Holidays, will achieve an orderliness, stability and harmony in our time-system that is so significant a characteristic of the solar system.

Your past president, Dr. A. Vibert Douglas, in an address before the Royal Canadian Institute, November 1940, said:

> The success which has attended man's efforts to solve some of the problems of space and time, and the vast picture of an ordered universe that he has unfolded are a challenge to mankind today to view the discord and tragedy of terrestrial things against a cosmic setting and turn his attention to the international task of establishing upon the earth some semblance of the majesty, beauty and harmony of the universe of stars.

Calendar reformers are endeavouring to impart to the various time-units in the universe of Time—as measured by the calendar—

"some semblance of the majesty, beauty and harmony of the universe of stars."

It doesn't take much scrutiny to draw the conclusion that our present Gregorian calendar is the direct antithesis of the principle of the solar system. It completely lacks order and harmony. Days, dates, weeks, months and quarterly divisions of the year have no regular places in the calendar. They wander about in an aimless fashion. Days and dates never agree, weeks run in and out of months in an unpredictable way, months are unjustly irregular in length, quarterly divisions are unequal, in that the first two are deprived of their rightful length while the last two quarters have an excess of days, and a year is never fully complete with its different time-units. The week is always short one day so that each year must steal a day from the following week to complete itself, and sometimes a year enters into a 53rd week. Every ordinary year contains one day and in leap years two days over an exact number of 52 weeks. All this confusion naturally creates conflict. It is little wonder, then, when we consider the importance that Time plays in our daily affairs, that everything we do is tinged with conflict as well. Like begets like.

Comparing the planets of the solar system with the conflicting time-units of our present calendar, let me personify them in a similar manner. We just cannot conceive of Venus, so envious of her neighbor's larger size, that she forcibly intrudes upon the earth to annex a part of the earth's sphere; or that mighty and powerful Jupiter, ignoring space and distance, takes from the earth her only moon to add to his other eleven moons because the earth, according to Jupiter, has no right to this particular possession; or that Mars, jealous and angry in not having rings like Saturn, aggressively enters upon Saturn's domain to take from it at least one of the longed-for rings. No, the various planets under the magnetic rulership of the sun are above such petty, selfish, greedy and unworthy ambitions. They know that were one of them but for one instant to harbor any such base ideas the entire solar system would disintegrate and collapse. While we do not collapse with the use of our calendar, *we do suffer with it.*

The new perpetual World Calendar removes all this conflict by arranging the days, weeks, months, quarterly divisions or

seasonal periods of every year in a system of order and equality. Each time-unit has its rightful place in the calendar so that the year contains exactly 364 days, 52 weeks, 4 quarterly divisions approximating the 4 seasonal periods, and 12 months.

Reducing the year into sections of four quarters, we find that each quarter has 91 days, 13 weeks, 3 months or one season, always begins on a Sunday—the first of January, April, July and October —and always ends on a Saturday—the 30th of March, June, September and December. Each month has 26 weekdays plus Sundays and the unreasonable difference that exists in the present calendar (such as the short February or two successive long months of 31 days) will disappear.

The World Calendar is orderly and systematic in arrangement with an invariable variation in the three months that avoids mechanical monotony and rigidity. As the four seasons vary within the year, so do the three months vary in the quarterly divisions, without either losing in any way their regular sequence and order.

To conform to the necessary 365th day every year and the 366th day in leap years, these two days, that are so essential in keeping the calendar in step with the seasonal year and in obtaining a newly found stability, are added to The World Calendar as Year-End Day at the close of the 364 days every year, and the Leap-Year Day is inserted in the mid-year that follows June 30th. They are the new World Holidays—forerunners it is hoped of better days to come.

The changes are few. But one or two days call for a rearrangement between February 28th and the 1st of September; the other months remain the same in both the Gregorian and The World Calendars. The Year-End Day World Holiday, December W, is identical with the old December 31st. Instead of this day coming on any day of the week as it does now, the old December 31st, which is the new December W, World Holiday, will always come on the extra day following December 30th, which we suggest as an extra Saturday instantly denoting the last day of the calendar year.

The acceptance of the World Holidays by the people takes courage, vision and faith; a pioneering spirit that unhesitatingly

accepts the new. These stabilizing and unifying days, as yet untried, will prove an open sesame for greater understanding among peoples.

Here then is a time-plan that typifies coordination, cooperation and concord in contrast to the Gregorian system of confusion, competition and conflict.

Although an improved calendar has been advocated for many years before this World War, it is more of a vital need today than ever before, because meticulous timing and accuracy in every detail are imperative in the world today.

Let me cite you a confusing condition in dating and a curious coincidence.

I had written a brief item for the *Journal of Calendar Reform* on the confusion to historians regarding the different methods of dating in use in the various countries. In the United States of America it is the custom to date letters and documents in the order of *month*, day and year such as December 3rd, 1945, which in digit form is 12/3/45, whereas Great Britain and other countries use the order of *day*, month and year, namely, 12th of March 1945, which in digit form is also 12/3/45, identical to the American date of December 3rd, 1945. I then concluded with these words: "Certainly with the adoption of The World Calendar, or even before if desired, it would be a gracious and wise act for the United States of America to establish the same method used by other countries."

On March 14th, when the galley proof of this item came to the office, the Associated Press in the afternoon of the same day carried a story of Major Randolph Churchill, wherein he requested Lord Hinchingbrooke to ask Prime Minister Churchill to adopt a uniform system of dating throughout the governmental departments. He urged the order of *day*, month and year and mentioned as an example 1st of October, 1945, which in digit form is 1-10-45. Thus by the English method the 1st of October, 1945—1-10-45—is in the American usage January 10, 1945.

Here then were two people, unknown to each other, one a Britisher in the Mediterranean area and the other an American in New York City, simultaneously reaching the same conclusion as to uniform dating.

Uniformity of dating among the nations leads directly to a

uniform and reliable calendar—The World Calendar with its equal quarters.

A generally acknowledged fixture in calendar recording, particularly, perhaps, in the field of government and finance, is the quarterly division of the year. It is the accepted basis for quarterly statements and government accountings in Washington where Federal departments are required to make quarterly statements to the Director of the Budget. While it is true that monthly statements and, in certain instances, weekly statements are prepared for government offices and business organizations, these refer to internal accountings. Quarterly statements and reports are used for external and public purposes, such statements offering at all times a broader field of survey and analysis, and giving a better perspective than can be had when only the smaller periods of months, weeks, or days are used.

Irrespective of what particular unit the various governmental departments use in their special field of accounting, be it on a weekly, monthly or quarterly period, these *all agree* at the close of every quarter-year in the new perpetual World Calendar. The practicality and ease of this new time-plan become immediately apparent. The regular and comparable 91 days or 13 weeks or 3 months within every quarter division are *interchangeable*. This is simplicity itself. The calendar thereby achieves a degree of perfection never as yet attained. Certainly today, when unity of action and clarity of statement are more important than ever, *a simplified calendar with its stabilized interchangeable time-units is indispensable*.

Quoting from an article on chain store operations by Ivan Burdick, former general manager of Canada's Stop and Shop Chain, merchandise manager of the Dominion Stores of Canada, and recent director of food rationing of the Office of Price Administration in Washington:

The "period" in the industry is the "quarter," not the week or the month. Three months is the closest, most practical expression of the "season," which is the real operating period. The best that operating executives can hope to do, restricted as they are by irregular and incomparable days, weeks and months, is personally to know what goes on four times a year, and to do something about it. Any more frequent presentation of figures is Utopian, any less is dangerous. Four quarterly analyses for scientifically equalized periods are ideal. I am for it.

The equalized quarters are as important to finance as they are to the government. They have an even greater appeal to the average person since economics affects everyone of us.

In our present calendar where the quarters vary between 90, 91 and 92 days, it is the custom of many bankers to reckon a ninety-day note as one fourth of a year, or a quarter year, based on the 360-day year with corresponding cost to the borrower. This injustice is unavoidable wherein quarters, months, weeks and days fluctuate as they do in the present calendar.

With the use of the stabilized and equalized quarterly periods of The World Calendar justice will be had. There is no variation from the convenient 12-month year and no cause to abandon the equally convenient periods of halves, thirds, quarters and sixths. Each quarter payment is reckoned on the 91-day period based on the 364-day year, and a quarter year interest is paid for 91 days of actual use or one-fourth of a per annum rate. Thus in a 91-day quarter, by making the quarter the unit, thirty days is one-third of it. The 91st day of every quarter is caused by the first month having five Sundays. Likewise equal quarters give equal half-years of 182 days each, plus the new World Holiday Year-End Day that terminates every year. This day as well as the Leap-Year Day is not reckoned in the regular business year as both are non-working days.

In addition, quarterly payments on insurance, instalments, dividends, interest, mortgages and loans will always fall due on the same weekday and month-date in every quarter division and the year itself. Arrangements to meet such payments will be greatly facilitated.

For the banks: the monthly statements, interest on individual loans, capital to be advanced to business organizations, and international indebtedness, can be easily met and arranged for when the entire world, nations, governments, business, banks and individuals, all use the self-same, equalized and equitable, stable World Calendar.

In the field of publications such as the Canadian MacLean's magazines and *Saturday Night*, advertising contracts are made on the 13-week basis, similarly as the weekly magazines in the United States. This 13-week period will be identical and interchangeable

with the equal quarter-year division of The World Calendar. And radio, too, has for many years functioned on an arbitrary 13-week or a quarter-year period which will benefit with the new system of equal quarters.

We have frequently been asked, "What about the calendar manufacturers, are they not being discriminated against?" Calendar makers will not suffer with the calendar every year the same, just as clock-makers do not suffer with clock dials always the same. A recent letter from England inquired, "Would not the perpetual World Calendar create a calendarless future?" Emphatically NO. The business world and our homes would become quite cheerless without the many artistic and decorative calendars that appeal to our eyes, emotions, and sense of beauty. And besides, human nature likes a certain ordered variety. There will always be a demand for different calendar designs, and calendars, which carry the phases of the moon or the changes in the tides, must obviously be brought out anew every year. Almanacs, diaries, desk pads and notebooks are utterly worthless after one year's use and call for replacements. But the mechanical set-up of the calendar itself will be vastly simplified when the calendar-pattern does not change, when every year begins with Sunday, January 1st, and closes with the Year-End Day, World Holiday, the day that is so rich in meaning, suggestive of world unity, international observance and national, civic and social cooperation.

In reforms of whatever nature there seems to be of necessity some opposition. Now opposition, when given free expression, serves to restrain hasty action and leads to more comprehensive study of the subject in hand. The World Calendar is no exception. The opposition to it is directed to the one or two World Holidays on the ground that these break the alleged continuity of the seven-day week since time immemorial. You astronomers, dealing as you do with the problematical age of the world, will realize that this stand is untenable.

Ancient history, ancient ideas on astronomy, on natural phenomena and on religion must be approached with tolerance. There is too much hidden and as yet not known or understood that prevents us from taking so definite and dogmatic an attitude. The particular opposition, recently expressed by certain religious

minority groups, sincere though it be, appears to be based on an unreasonable fear of the new and a blind adherence to the old.

In a way, however, this opposition is enhancing the value and revealing the benefits of these extra days—the new World Holidays. The opposition clearly reveals that a broader outlook must prevail so that the general good of mankind shall *not be hindered* by backward-looking groups. The pioneering spirit, that overcomes all obstacles, is essential in bringing about this much-needed revision of the calendar. We only have to recall Copernicus and Galileo, Pasteur and Curie, the recent discoveries of electricity, telephone, and radio, to realize that vision, courage and faith are qualities on which the world moves forward. To stand still is to stifle progress. It is the privilege of us all to uphold and to work for this indispensable new time-plan that is inevitable.

May I also remind you that the adoption of the reform of the civil calendar belongs to the governments and that religious feast day observances, among them a fixed Easter, are within the province of the churches.

It is now my great pleasure to tell you that in the favorable report of the Ottawa Centre on calendar reform, published in the Journal of your Society for July-August, The World Calendar was approved by a "high majority," with the suggestion that the other Centres of your Society inform the General Council of their opinions, so that the Royal Astronomical Society of Canada as a national body may endorse it. I sincerely hope the Centres will follow this wise suggestion.

You may also like to know something of the progress The World Calendar has made since my last visit to Canada a year ago.

Mentioning a few of the endorsements for this new calendar I include the Council of the Board of Trade in Halifax, Nova Scotia, the Association of Professional Engineers of the Province of New Brunswick, the Engineering Profession in British Columbia, and the endorsement of the Canadian Retail Federation provided The World Calendar receives general acceptance throughout Canada; in America—the American Institute of Accountants, the National Council of Geography Teachers, the Executive Committee of the Texas State Teachers Association and the International Affiliation of Sales and Advertising Clubs which includes Canada and the

United States; in other countries—the Australian Branch of the British Institute of Physics, and the Mexican Hotel Association. Here is certainly an international collection of endorsements.

Today, the world is experiencing an inspiring and thrilling demonstration of cooperation in that the United Nations are standing foursquare in their joint efforts for the winning of the war. Other evidences of cooperation are the international conferences held on postwar programs and peace plans such as Bretton Woods, Dumbarton Oaks, Yalta, Chapultepec and the forthcoming conference in San Francisco. These are all decidedly hopeful signs of a newer spirit of a commonwealth of purpose and ideals welling up from the hearts and minds of men. In such manner we are building not only one world but one *united* world.

Toward the furthering of these practical ideals we would be greatly aided were we to establish systems based on the same cooperative principle such as we have seen in relation to Time, as it is served by The World Calendar.

By adopting The World Calendar together with the uniform dating method of which I spoke earlier, and with the uniform use of the 24-hour clock time on which I spoke before the Ottawa and Montreal Centres a year ago; these three distinct time-instruments might easily pave the way for the ultimate acceptance of other constructive and international reforms. Thus we urge that these three time methods should be earnestly considered and approved in international programs, discussions and conferences dealing with present day conditions, postwar programs, and peace plans. Being free from the human equation and nationalistic aims, they may easily lay foundation stones upon which to build the world on more secure and solid ground.

The time is here and now for everyone to act within the immediate next years, before 1948, so that plans may be made to adopt The World Calendar, Sunday, January 1, 1950. This date is important in that both the old calendar and the proposed new calendar agree. Not until 1956 will another such opportunity arise, and certainly to delay ten years from now is not justified.

We may with benefit recall President Roosevelt's recent words regarding the establishment of an international organization, when he reported before the Congress of the United States on the confer-

ence with Prime Minister Churchill and Premier Stalin at Yalta. He said: "This time we are not making the mistake of waiting until the end of the war to set up the machinery of peace." And neither should calendar reform be compelled to wait.

Man, as he uses The World Calendar in his measurement of time, repeating the words of the former president of your Royal Astronomical Society, will have turned "his attention to the international task of establishing upon the earth some semblance of the majesty, beauty and harmony of the universe of the stars." Thus the principle of the solar system will have become manifest on the earth by means of the uniform 24-hour clock, the uniform method of dating, and the uniform use of the steady and ordered World Calendar: stalwart pillars upholding the principles of co-ordination, cooperation and equality, which have a deeper meaning and a fuller understanding for making this world of ours—ONE UNITED WORLD.

World Calendar Association,
International Building,
630 Fifth Avenue,
New York, 20, N.Y.

LOGAN'S FAULT

By F. J. Alcock

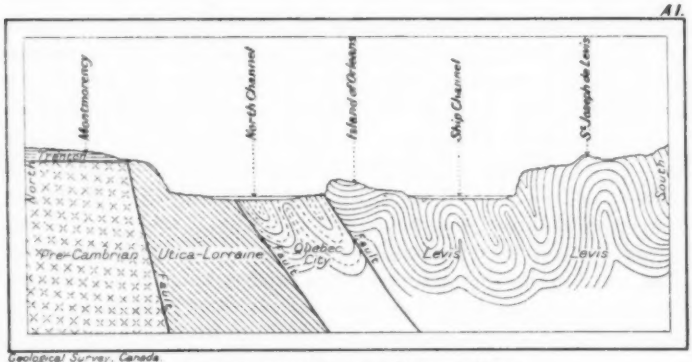
THE name, "Logan's Line" or "Logan's Fault", is familiar to everyone who is acquainted in even a casual way with the geology of eastern Canada. The term has been widely publicized and misconceptions concerning it are frequently quoted. For example, whenever an earthquake shock takes place anywhere in the general region of the St. Lawrence River the question is repeatedly asked whether the disturbance is not probably due to another movement along this old line of fracture. The following is intended to serve as a brief statement of the more important facts about the fault.

The fault received its name from the man who first recognized it, Sir William Edmond Logan, founder and first director of the Geological Survey of Canada. Logan received his appointment in 1842 and in the following year began work in Gaspé Peninsula. His mapping here and in later years farther southwest in Quebec showed that the St. Lawrence River region lies along the boundary between two quite different types of geological structure. Along the upper part of the river the underlying strata are of early Palæozoic age showing practically the same stratigraphic succession as that worked out in the western part of New York State. The beds for the most part lie flat or nearly so, have been intruded only locally by igneous rocks, and where broken by faults, the latter are commonly of the normal type due to tension. To the southeast on the other hand, the beds, though of the same early Palæozoic age, are of different facies to those of corresponding age to the northwest, i.e., they show different lithology and fossils; they also have high dips, are locally metamorphosed, are intruded by numerous masses of igneous rocks, and are broken by faults of the thrust type due to compression.

Work in 1860 in the vicinity of Quebec City gave Logan the explanation of these differences. He found there a zone of overturned folding and thrust faulting and drew the inference that the whole line between the highly disturbed and only slightly disturbed belts is a major fault. From the geological mapping it was quite easy to outline its general course. It enters Canada from Lake

Champlain, passes in a gently curving line to Quebec City and from there follows along the St. Lawrence River. Near the mouth of the river it swings to the east and then southeast passing between Anticosti Island and Gaspé Peninsula and then somewhere in the neighborhood of the Magdalen Islands again swings to the northeast to the Strait of Belle Isle. The fault is the boundary between the Appalachian region characterized by Palæozoic folding the thrust faulting and the Interior Plains region which shows but little disturbance.

Though one commonly passes across from the undisturbed to the disturbed rocks within short distances, in places a matter of a



Geological Survey, Canada

Generalized section across St Lawrence Valley

few feet, the fault was not a single break but locally at least a complex one. At Quebec City and the surrounding region the Logan thrust shows three branches and in addition there is also normal faulting distinct from it. The relationships are shown in the diagram. The oldest rock is the Precambrian granite. Then in order of age there follow the Levis formation of early Ordovician age, the Quebec City formation of Trenton or Middle Ordovician age and the Utica-Lorraine beds belonging to the Upper Ordovician. The Ordovician strata have been thrust from the southeast against the resistant Precambrian rocks to the northwest and in the process were overturned and fractured. Two branches of the Logan

thrust are shown in the diagram, one on either side of the belt of Quebec City beds.

The normal fault on the north side of the St. Lawrence which is well shown at Montmorency is also of interest. Here the Ordovician beds northwest of the Logan thrust have been dropped down against the Precambrian granite. The granite is overlaid with normal contact by flat-lying beds of Trenton limestone, of the same age, though of an entirely different facies from the Quebec City beds. Evidently in pre-Trenton Ordovician time the Precambrian rocks here formed a shore facing southeast, and the seaward slope must have been fairly steep to permit the accumulation of the considerable thicknesses of early Ordovician rocks. It was not until the Trenton stage that the sea swept over these Precambrian rocks to the north.

At repeated horizons in the early Ordovician succession are layers of limestone-conglomerates which are believed to have been produced as a result of earthquake movements along the sea floor while the sediments were accumulating. The coastal slope referred to above, composed of Precambrian rocks, was evidently a hinge along which, during the early Ordovician, intermittent subsidence took place to the southeast and uplift to the northwest. Later at the close of the Ordovician compression from the southeast folded the strata and produced mountainous topography. This period of deformation is known as the Taconic orogeny.

In early Middle Devonian time there was another period of mountain building and this time too the thrusts came from the southeast producing folds and overthrust faults. This deformation was accompanied by the intrusion of numerous masses of granite. Just how much of the displacement along the Logan fault dates from this later orogeny is not known. The total displacement is, however, certainly large. Mention has been made of the fact that the Quebec City Trenton beds represent an entirely different facies from the undisturbed Trenton beds at Montmorency. In New York State the strata carrying the same fauna as the Quebec City beds lie some 50 miles east of the nearest outcrop containing the typical Trenton fauna. From this it has been argued that the amount of shortening in the northeast direction was of the order of magnitude of 50 miles and may have been considerably greater.

This would mean a large displacement along the Logan fault and as a result the dip of the fault plane for most of the distance must necessarily have been low.

Since the Devonian period the region has been affected by no major deformation. Vertical movements of an epeirogenic nature have taken place but there is no evidence of any later displacement along the Logan fault. Recent earthquakes would much more likely mean adjustments along steeply dipping normal faults than ones along the low-dipping Logan thrust.

Geological Survey, Canada,
Ottawa, Ontario.

"ARCTURUS"

Par J. EDGAR GUIMONT

"La nuit était splendide, un manteou de velours clouté d'or et des diamants d'innombrales étoiles; dans l'air plus léger flottoinent encore les sentours lourde3 du jour. . . . .
EM. LAUMANN, "L'Inde Mystérieuse".

UN soir, je me promenais, tout en philosophant, sous la ramure d'une épaisse forêt laurentienne, au moment où, lentement, déclinait la lumière solaire. Un demi-jour passait à peine et comme a regret à travers les interstices du feuillage, donnant au sous-bois une teinte sombre.

L'air calme, lourd, étouffant, était saturé d'un parfum étrange et pénétrant. Sans hâte, pour mieux jouir du spectacle j'avançais dans ce lieu désert propre à la méditation; lorsque, au moment où je m'y attendais le moins, je découvris une étendue d'eau au sein même de cette immense forêt!

Cette nappe liquide au milieu de cette floraison forestière, me parut étrange! Je m'en approchai; pour admirer le calme parfait du lac et la teinte glauque de ses eaux; cela me fascinait, me troublait. . . J'en contemplai la surface, le miroir magique qui, de plus en plus, m'attirait. Bientôt la teinte glauque du début, se changea en un gris-ardoise. Plus je fixais cette immobilité liquide, plus ce mirage enchanteur m'impressionnait. Je considerai longuement cette eau morte, où pendant le jour se mirent les plantes aquatiques, la verdure des rives, le feuillage des arbres et pendant la nuit les ombres nocturnes et les astres scintillants.

Attiré par ce lac énigmatique, je m'inclinai davantage, je me penchai sur ses bords, puis m'approchant au-dessus d'étranges et mystérieuses plantes aquatiques, inconnues même de notre grand Marie Victorin, j'en respirai longuement, passionnément le parfum qui s'en dégageaient et cela si fortement, que j'en perdis la notion du temps et de l'espace. . . . . .

. . . . . .

Lorsque je repris conscience de moi-même et du lieu, je constatai qu'autour de moi régnait une nuit calme, profonde, et que là-haut, scintillaient les étoiles. En effet, au loin, vers l'ouest, à travers les branches et les feuilles, je vis dans le bleu sombre du ciel, une étoile rougeâtre scintiller d'un éclat inaccoutumé.

Je cherchai une éclaircie puis, par la disposition des étoiles, je reconnu la constellation du Bouvier trônant dans le ciel et remarquai aussitôt Arcturus et son éclat fulgurant. Je songeai alors à cet astre si beau qui, depuis des siècles brille sous la voûte bleue de nos ciels d'été.

Connaissez-vous Arcturus ou Alpha du Bouvier, l'une des vingt plus brillantes étoiles du ciel? Non!... Eh bien, suivez-moi! Regardez vers le ciel, dans le prolongement un peu arguée de la queue de la Grande Ourse. A une distance angulaire d'environ 31°, vous y trouverez un groupe de six étoiles, formant un pentagone allongé, dont les trois étoiles du nord forment un triangle isocèle. C'est la constellation du Bouvier. L'étoile la plus brillante du groupe, qui se trouve dans la partie inférieure, c'est Arcturus, étoile de première grandeur, la principale et l'une des plus anciennes de la sphère céleste.

Les Arabes l'appelaient Simâk, parce qu'elle s'élève très haut dans le ciel. On a aussi donné à Arcturus le nom de Gardien du Nord, de Fossoyeur, de Crieur et de Grand Hurleur. Comme il est censé garder les sept étoiles du nord, les sept bœufs (septemtriones), on la désigne volontiers sous les noms de Berger, de Gardien de l'Ourse (Arctophylax), de Conducteur de troupeaux, de Voyageur, de Chasseur, d'Agriculteur, de Moissonneur, etc.

Arcturus, est une étoile très ancienne, Homère et Hésiode regardaient cette étoile comme funeste aux navigateurs, parce qu'elle présageait les tempêtes, mais voulaient toutefois qu'elle fut consultée pour les travaux des champs.

Le grand Virgile écrit dans son livre premier, au verset 68 des Géorgiques:

"At si non fuerit tellus fécunda, sub ipsum Arcturum tenui sat erit suspendere sulco:"

"mais si le sol est peu fecond, il suffira d'y tracer, au retour de l'Arcture, un léger sillon."

Acturus est la première étoile que l'on voit briller le soir et les bonnes vues peuvent l'apercevoir environ un quart d'heure après le coucher du soleil, par 14h 11m d'ascension droite et 19° 42′ de déclinaison, (1900).

C'est Morin, dernier astrologue de France, qui en 1635, fut le premier à l'apercevoir à l'œil nu en plein jour. Cet astre resplendit

avec tant d'éclat qu'il est avec Véga de la Lyre, le plus beau soleil de l'hémisphère septentrional d'été.

Si Véga est d'une blancheur éclatante, Arcturus brille comme un feu intense, d'une chaleur telle qu'elle influence nos thermomètres. Par contre, sa lumière met plus de temps à impressionner la plaque photographique que Véga, en raison de sa couleur orangée, alors que celle de Véga est bleuâtre, donc plus photogénique. De plus, cet astre semble déceler des feux d'une évolution très avancée.

Quoique cette étoile ait paru de tout temps la plus proche de la Terre tant à cause de son éclat qu'à cause de son grand mouvement propre, les astronomes avaient tous échoués dans la recherche de sa parallaxe. Ce ne fut qu'en 1842 que Peters, après les plus minitieux calculs, la trouva de 0″ 127, valeur qui équivaut à 1,624,000 fois le diamètre de l'orbite terrestre. Sa parallaxe actuelle est de 0″ 102.

Elle est la première étoile dont on ait cherché à déterminer la distance à la Terre, qui est de 40 années-lumière. C'est un soleil gigantesque, éloigné de nous à des distances si vertigineuses que l'imagination ne peut les concevoir.

C'est une des étoiles dites "géantes" et les professeurs Michelson et Pease lui ont trouvé un diamètre de 20 millions de milles, soit environ 25 fois celui du Soleil.* Son volume équivaut à 15,000 fois celui du Soleil.

Pour de ce qui est de son éclat, c'est l'une des quatre plus brillantes étoiles de l'hémisphère nord et de magnitude 0.2.

Sa chaleur est 100 fois plus ardente que celle du Soleil. Sa température superficielle est de 7000° Fahrenheit.† Cette chaleur venant de son rayonnement, mesurée par le professeur E. F. Nichols, est égale à une chandelle placée à une distance de 5 milles.

Arcturus est l'une des premières étoiles dont le mouvement propre ait été décelé et cela par l'astronome Halley en 1718 lorsqu'il compara les positions en latitude de cette étoile, avec celles qui avaient été observées par Hipparque, 127 ans avant notre ère. Ce mouvement est si rapide, qu'on peut le constater sur des observations faites à l'œil nu; c'est-à-dire que cette étoile se déplace dans le ciel de 2.287 par an, suivant un grand cercle dirigé vers le sud-

*30 fais, selon Paul Coudere

†4000° selon Paul Caodere.

ouest; qu'en huit cents ans ce déplacement égale le diamètre apparent de la Lune, et que depuis l'époque d'Hipparque elle a déjà parcourue 75 minutes d'arc ou 1° 15′. C'est l'une des étoiles les plus rapides du ciel avec sa vitesse de 84 milles par secondes en direction de la Vierge, soit sept fois plus rapide que le Soleil.

A cela, ajoutons que le 5 octobre 1858, la comète Donati passa à seulement 20 minutes d'arc d'Arcturus. Ce fut pour les témoins de l'époque, un beau spectacle.

Une chose que bien des gens ignorent, c'est que, pour l'ouverture officielle de l'Exposition de Chicago, au printemps de 1933, l'on se servit de l'étoile Arcturus. Son mince filet lumineux, à la vitesse de 186,000 milles par seconde, après avoir parcouru l'espace pendant 40 ans, à dater de 1893, donna naissance au flot de lumière qui illumina cette manifestation internationale consacrée à la Science et à l'Industrie.

Pour cette première expérience l'on utilisa la célèbre lunette de l'observatoire de Yerkes, non loin de Chicago.

A l'endroit où le rayon lumineux se concentre au foyer de l'objectif, l'on plaça une cellule photo-électrique au potassium. Ces cellules, du reste, employées pour la télévision et le cinéma sonore, sont constituées par une ampoule de verre contenant deux electrodes dont l'une est recouverte de potassium et l'autre d'un métal dont j'ignore le nom; elles ont la propriété d'émettre un courant électrique quand elles sont touchées par un rayon lumineux.

J'aurais aimé à donner plus amples détails sur ce merveilleux mécanisme, mais faute d'espace, je dois me limiter.

L'histoire d'Arcturus n'est-elle pas intéressante? Toutefois, c'est une monde, qui là-bas, dans les cieux, passe sereinement orgueilleusement, dédaignant nos misères, nos conflits et nos sottises!

l'Observatoire "Ville-Marie",
Montreal, Novembre 1944.

HER MAJESTY'S MAGNETICAL AND METEOROLOGICAL OBSERVATORY, TORONTO

By A. D. Thiessen

(Continued from page 472, vol. 36, Dec. 1942)

Part X.—Captain John Henry Lefroy, R.A., Director, Her Majesty's Magnetic Observatory, 1842-1853. (Letters from November 20th, 1846, to November 12th, 1850.)

As we have seen,[74] Captain Lefroy returned from his honeymoon in England and resumed his charge on November 20th, 1846. "On the 21st of November we found ourselves once more happily under the roof of Beverley House, and there remained as visitors until the observatory cottage was ready for our reception. This was not before February 18th, 1847." Three days later his first child, Harry, was born.[75]

"The observatory cottage," he wrote, "was of very slight construction, and difficult to warm. I have often seen the water on the wash-handstand in our bedroom frozen solid; that in the water-bottles, having an open neck to expand into, would sometimes overflow in ice round the neck without bursting them."[76]

Soon after his return, Lefroy was heavily engaged in his routine duties again. The methods of instantaneous photography had been discovered and developed in the years after 1837, and when Lefroy visited England in 1846, Colonel Sabine was "very hot upon introducing magnetic registration by means of photography at Toronto."[77] Colonel Sabine wished Lefroy to take his opportunity to learn these methods from someone named Charles Brooke. At some inconvenience to himself, Lefroy had gone several times to Mr. Brooke's house. But "it was altogether premature. Brooke had not mastered it himself, and seemed to have little idea of instruction." It was not until more than a year later that they got it to work at Greenwich Observatory. Lefroy had never actually seen a sheet of paper prepared or developed, and the consequence was that when the apparatus was sent out to Toronto, he had everything to learn. "To make matters worse, there was a rival method by Mr. F. Ronalds,

employing the Daguerreotype method, which Sabine must needs send out too. *They made my life a burden for two years.*"[78]

His life from 1847 to 1848 was "laborious and uneventful," as he was engaged in the very difficult task of "endeavouring to reduce the registration of magnetical phenomena by photography to a practical certainty, in addition, of course, to carrying on the current work of the observatory."[79] It really was too much for him, and he seems to have been actuated by pure excess of zeal, "for," he says, "I was often called by the N.C. officer on duty between 12 and 1 a.m., and repaired to the observatory until 4 a.m. If I had worked less with my hands, and more with my head, it would have been much better, but I was by temperament more of an actor than a thinker."

As soon as he returned to Canada his only educated assistant Lieut. Younghusband, returned to England, and Lefroy was left without "a second mind to take counsel with."

For his work in St. Helena and Canada, Lefroy was elected a Fellow of the Royal Society on June 9, 1848.

By October, 1850, his health failed so much from overwork and worry that he applied for a Medical Board. His physician, Edward M. Hodder, M.C., and Member of the Royal College of Surgeons, England, stated, on October 15th, 1850, that he had been "Captain Lefroy's . . . medical attendant for some years past, during which period I have several times had occasion to prescribe for him.

"He is now (I conceive) in a very delicate state of health, losing flesh fast, and becoming highly nervous and excitable. His sight, also, from close attention to his duties, is much impaired, and from the little benefit he has derived from Medical Treatment, I strongly advise his taking a Trip to Europe.

"I might add that his digestive organs have completely lost their tone, and I believe that they will not materially improve so long as he is obliged to follow his present arduous occupations . . . Toronto, October 15th, 1850."

The Board, consisting of I. French, Inspector General of Hospitals, I. T. Telfer, Staff Surgeon, 2nd Class, W. Barrett, Staff Assistant Surgeon, and Brigade Major George Sandham, found that Lefroy was "nervous, excitable, and Dyspeptic, attended with

considerable impairment of Vision, which in the opinion of the Board are the results of close application to his duties, and as he has derived little benefit from Medical Treatment,

"The Board are further of the opinion, that change of climate and relaxation from his arduous occupations are essentially necessary for the restablishment of his health, and do therefore recommend that he be granted leave of absence to England accordingly. . . . Montreal, C.E., 22nd October, 1850."

Thereupon Lefroy found a young officer in the command, Lieutenant, later Major-General, W. Goodenough, C.B., "who with a little instruction was competent to carry on the routine work of the observatory, with already trained assistants; and after initiating him into it, I sailed from New York on the 16th [of November] in the sailing packet *Yorkshire*, and reached London on the 11th December."

During this period there were the usual delays in the receipt of authorization for the continuance of the establishment, already mentioned in these articles. However, finally, in 1850, it was settled "that the Toronto Observatory should be handed over to the Provincial Government on the 31st of March, 1853."[80]

For the sake of completeness, certain letters of a purely routine nature are included in this series, as their number is small, and as they reveal an intimate picture of the life of the first observers in Toronto's observatory. For this reason, letters showing changes in the staff of the observatory, promotions, and dismissals are published, as well as letters regarding the removal from the observatory of personnel by retirement or death, and the issue of rations to the families of observers.

The letters dealing with experiments in photography are of scientific interest and should be published; so also the letters showing how observations of northern lights were instituted. The difficulties in managing new photographic equipment, and Lefroy's genuine interest in new lines of scientific investigation, as well as his participation in the life at Toronto, as evidenced by his membership in the Canadian Institute, of which he was President for more than three years, made Lefroy's life an extremely busy one. These letters are therefore of much interest. Sabine, who was probably unaware of the full extent of Lefroy's difficulties, became

impatient with the young director and the resulting estrangement between Lefroy and Sabine is probably to the discredit only of the senior officer at Woolwich, who should have recognized the quality of Lefroy's work from the voluminous data he turned in for publication, not only from his observations in Toronto, but from his scientific expedition through northern Canada. Their relations were further strained by difficulties over the payment of the cost of the Magnetic Survey of Northern Canada conducted by Lefroy. The letters throw some light on this, too.

Lefroy was later to play an important part in the administration of the War Office during the Crimean War, and his interest in the affairs of his country deserves mention. One letter, particularly, allows us a glimpse into his mind and reveals his attitude to politics, religion, and government, as he discusses the Irish question to which Englishmen were then, as always, seeking an answer.[81]

His experiences in the United States appear to have been happy ones, as he repeatedly, in his *Autobiography*, refers to the cordiality of his friendships there. He paid many visits to the United States, particularly to Harvard University, and in persuading the British and Provincial authorities that it would be desirable to continue the work of the Observatory after the military establishment should be withdrawn, he enlisted the support of some of his friends in the United States in this cause. Letters reflecting this part of Lefroy's interest are also included.

One of the last things Lefroy had done before leaving for England had been to dismiss his servant, Gunner Cooper, and one of the first things he did upon returning was to engage someone to take Cooper's place.

Magnetic Observatory,
Toronto, Nov. 24th, 1846

Sir,

I have the honor to request that you will permit Gunner and Driver Charles McKee of Captain Symons Company, 1st Battalion, at present belonging to the Detachment at the Fort, to be transferred to the Magnetical Detachment as my servant, in the place of Gunner Cooper, discharged by me before I left Toronto on leave of absence. I beg leave to state that Gunner McKee is desirous of entering my service. I have also to request that you will be pleased

to give direction for the disposal of Gunner and Driver McNulty, lately servant to Lieut. Younghusband who is at present a supernumerary on the Magnetic Detachment.

I have the honor to be,
Sir . . .
J. H. L.

Lieut. Col. Dalton,
Commanding Royal Artillery,
Canada West.

Gunner and Driver Charles McKee, who was brought into the observatory to replace Cooper, turned out to be a failure likewise, for on March 29th, 1847, Lefroy asks for his recall to barracks.

Toronto, 29th March, 1847

Sir,

I have the honor to report to you that I have been dissatisfied with my servant Gunner and Driver McKee, 1st Battalion, and am desirous that he be permitted to rejoin his company, another servant being appointed me in his stead. I was under the necessity on the 27th February of turning this man and his wife out of my house, chiefly in consequence of the repeated intoxication and misconduct of the latter. I had also seen enough of the propensity for liquor of Gunner McKee to have decided on parting with him. Being unable to dispense entirely with his services, I made a temporary arrangement by which they could remain here until the opening of navigation. I beg leave to state that I should prefer an unmarried man who will sleep in the Barrack Room of the Detachment, to a married man for whose family there is no accomodation on the spot.

I have, etc.,
J. H. L.

Lieut. Col. Dalton,
Commanding Royal Artillery,
etc. Canada West.

On November 24th Lefroy recommended one of the original members of the establishment for an increase in pay for faithful service.

Magnetic Observatory, Toronto,
November 24th, 1846

Sir,

I have the honor to submit to your consideration the claims of Serjeant J. Johnston, Senior N.C. officer at the Magnetic Observatory, to an increase of extra pay, on the completion of the seventh year of his present duties. Serjeant Johnston, in addition to the ordinary duties of an assistant, acts as Pay

Serjeant and Serjeant Major to this Detachment, and has so acted since 1839. He has the preparation of numerous military returns and reports, and many miscellaneous duties as senior N.C. officer, which encroach materially upon the time left to him after his magnetical duties are discharged. His excellent conduct has been more than once brought to your notice by the officers directing the observatory, and I have felt myself warranted in promising him, subject to your approval an increase of Extra pay, to 2s. per diem—the addition being 9d. per diem, to be charged against the contingent account as remuneration for extra labour in computation, Serjeant Johnston having always performed nearly or fully as much of the labour connected with the observations as the other N. C. officers. His increase of pay will date from the 1st December, 1846.

I have, etc.,
J. H. L.

Lieut. Col. Sabine,
Superintending Magnetic Observatories.

The position of the officer in charge at the Toronto Observatory was "that of an officer on Special Service." He was "not available for Military Duty except under special circumstances, when the officer commanding the Royal Artillery in the Canadas was authorized to require them."[82]

Lefroy's batman, Serjeant William Henry,[73] who accompanied him in his magnetic survey of North America in 1842, expressed a desire to return to England in the spring of 1847. His request was granted, but not until June 16th, 1847.

Magnetic Observatory,
Toronto, 8th December, 1846.

Sir,

Serjeant Wm Henry of Captain August Frazer's Company, 10th Battalion, who accompanied me to Canada in 1842, as assistant for the Magnetic Survey of North America, has expressed a desire to be permitted to return to England in the spring of 1847, to rejoin his Company. Serjeant Henry volunteered with the understanding that his service abroad would not extend beyond three years, and I beg to recommend his application, to be relieved, he having sometime ago expressed a wish for a Furlough, to return home on his private affairs. Serjeant Henry may be considered a supernumerary on this establishment during the present suspension of the Magnetical Survey, but I beg to state that the amount of work performed at the observatory has so much increased since the scale of the Establishment was last fixed, that his services can ill be spared, and I could wish that you will make application to the Adjutant General for a young N.C. Officer, or intelligent Gunner, to be made Acting Bombardier, who may replace him.

I have, etc.,
J. H. L.

Lieut. Col. Sabine,
Superintending Magnetical Observatories,
etc.

Toronto, 29th March, 1847.

Sir,

I have the honor to acknowledge the receipt of your letter of the 26th inst., informing me that you have received directions to withdraw Serjeant William Henry, 10th Battalion from this detachment, for his return to England, as soon as he can be spared. I beg to state that at present the services of this N.C. Officer are much required here, and that I do not think they can be dispensed with much before the arrival of his successor, who I am informed is at present under preparation at Woolwich, and will come out with the first detachment. I shall however have the honor of notifying to you as soon as his services can be dispensed with.

I have, etc.,
J. H. L.

Lieut. Col. Dalton,
Commanding Royal Artillery,
etc.
Canada West.

Magnetic Observatory,
Toronto, 16th June, 1847.

Sir,

With reference to that portion of your letter of the 31st March ultimo, which informs me that you have received orders to withdraw Serjeant W. Henry, 10th Battalion from Toronto as soon as his services can be dispensed with here. I have the honor to report to you that that N.C. Officer will be in readiness to proceed to Kingston whenever you are pleased to direct him to do so.

I have the honor, etc.,
J. H. L.

Lieut. Col. Dalton,
Commanding the Royal Artillery,
C. W.

For misconduct, Thomas Menzies had been dismissed, then restored to the rank of "Acting Bombardier *while he remains attached to the Magnetic Observatory.*"[83] On April 21st, 1847, Lefroy recommended that he be made eligible for promotion.

Magnetic Observatory,
Toronto, Canada.
21st April, 1847.

Sir,

I have the honor to bring to your notice the position of Acting Bombardier Thomas Menzies, of Major Cater's Company, 2nd Battalion, attached to this detachment, in consequence of the peculiar disadvantage to him which attends it.

Bombardier Menzies, then Gunner and Driver, accompanied Captain Riddell to Canada in 1839. He was appointed acting Bombardier, but in Sept. 1842 was reduced for some acts of irregularity, and made to rejoin his Company at Kingston. Upon the application of Captain Younghusband he was again appointed to this Detachment in June 1844, and upon my application, in consideration of his excellent conduct, Colonel Campbell was pleased to restore him, 6th June, 1845, to the Rank of Acting Bombardier, "while he remains attached to the Magnetic Observatory." He has now therefore been Acting Bombardier nearly two years. In consequence however of no special report having been made, I have ascertained that he is not borne as a N.C. Officer upon the Books of his Battalion at Woolwich, and is not advancing for promotion, and I feel that it is my duty to submit these circumstances to your consideration, trusting that it may be consistent with the rules of the service to place him upon the list for promotion.

I have the honor to state that Bombardier Menzies is a N.C. Officer of great intelligence and very valuable in his present position. His conduct has been perfectly satisfactory since he rejoined this Detachment in June, 1844. Having recently applied, at his own request, for the withdrawal of Serjeant W. Henry, 10th Battalion, the appointment of Acting Bombardier Menzies as a supernumerary, should you be pleased to direct it, will not add to the number of full N.C. Officers on this Detachment.

I have, etc.,
J. H. L.

The D. A. General, etc.,
Royal Artillery, Woolwich.

Observatory, Toronto, 15 December, 1848

Sir,

I have the honor to report to you for the information of the Commanding Officer, that I have received a communication from the 2nd Battalion office, Woolwich, announcing the Promotion of Bombardier Thomas Menzies of Captain Gambier's Company to be Corporal in Major Robe's Company.

Dated 3rd November, 1848
I have . . .
J. H. Lefroy, Captn. R.A.

The Acting Adjt., Royal Artillery,
Kingston.

On January 6th, 1848, Lefroy wrote to Lieut. Colonel Dalton that

"I have this day handed their parchment certificates of discharge to Gunners and Drivers McNulty and Stubbs, endorsing each with period of their service since the Commissioners board, on the 21st October, ult., namely, sixty-six days . . ."

On January 7th, Lefroy recommended Charles Jones for promotion, and on January 16th this was confirmed. On the 12th of January he recommended James Walker for increased pay.

Jones was mentioned again on September 30, 1848.

Toronto, 7th January, 1848.

Sir,

I have the Honor to bring to your favorable notice the excellent conduct of Gunner and Driver Charles Jones of Captain Taylor's Company 9th Battalion, who has performed the duties of an assistant in the magnetic observatory to my entire satisfaction since the 19th July ult. and has otherwise so conducted himself that I beg leave to recommend him for the appointment of acting Bombardier, under the intimation conveyed in your letter of 9th June, 1847.

I have the honor to be,
Sir,
Your most obedient Servant,
J. H. Lefroy,
Captain R.A.

Lieut. Col. Dalton, Commanding R. Artillery etc., etc., etc.,
C. W.

Magnetic Observatory,
Toronto, Canada West,
16th January, 1848.

Sir,

Lieut. Col. Dalton, Commanding Royal Artillery, C.W., having been pleased to appoint Gunner and Driver Ch: Jones of Captain Taylor's Company, 9th Battalion, an acting Bombardier by district Regimental order dated 10th January, 1848, I have the honor by his instructions to notify the same to you, with a view to being duly registered.

I have the honor to be,
Sir,
Your most obedient Servant,
J. H. Lefroy, Captain R.A.

The Officer Commanding,
9th Battalion, Royal Artillery,
Woolwich.

Toronto, 30th September, 1848

Sir,

I beg leave to submit to your consideration a recommendation in behalf of Acting Bombardier Charles Jones of Captain Taylor's Company, 9th Battalion, whose conduct since he joined this detachment has been such as I am desirous of bringing to the favorable notice of the officer commanding the Royal Artillery.

A.Br. Jones was reduced to the ranks by Sentence of Court Martial in 1839 for a pecuniary defalcation, into which however he was betrayed, there is reason to believe, in great measure, by another person. He has made every effort to pay off the debt, having devoted to that purpose, since he came under my command much more than the proportion which under her Majesty's regulations could be legally stopped out of his pay, and it appears by the inclosed statement that the debt is now reduced to comparatively small amount. Under these circumstances, and conceiving that from length of service, general steadiness and knowledge of the duties of a N.C. Officer, he is well qualified for promotion, I have now the honor to submit his case for your consideration in the belief that the indulgence of being restored to the Rank of N.C. Officer before he is entirely free from the debt which led to his reduction, will not be improperly exercised in his favor.

I have . . . J. H. Lefroy

Lieut. Col. Dalton,
. . . Kingston.

Original debt of Gunner and Driver Ch. Jones	£75. 8. 11.
Amount paid off from Dec. 1839 to June, 1847,	£30. 11. 6½
Amount due when he joined this Detachment viz. July 14th, 1847.	£44. 17. 4½
Amount paid off since July 14, 1847	£23. 2. 0
Balance still remaining 1st October, 1848,	£21. 15. 4½

J. H. Lefroy, Captain,
Royal Artillery

(*To be continued*)

---

[74]This JOURNAL, vol. 36, 1942, p. 470.

[75]LEFROY, *Autobiography*, pp. 112-13. A daughter was born on June 3, 1848, and a third child, a daughter, was born on June 27, 1850. The latter died on December 1st, 1853. *Op. cit.*, pp. 117, 121-22.

[76]*Op. cit.*, p. 113.

[77]*Op. cit.*, p. 109.

[78]*Ibidem.*

[79]*Op. cit.*, p. 114.

[80]*Op. cit.*, p. 123.

[81]Letters, September 30, 1848.

[82]The letter outlining this position was written on November 27, 1846. It was published in this JOURNAL, 1940, pp. 322-23.

[83]This JOURNAL, 1941, pp. 221-23.

NOTES AND QUERIES

Communications are invited, especially from amateurs. The Editor will try to secure answers to queries.

Aluminizing Mirrors for Amateurs

Amateur astronomers have often enquired as to the possibility of having their telescope mirrors aluminized in Canada. We are glad to be able to advise that Duplate Canada Ltd. is now in a position to do such work commercially.

For a number of years this firm has been coating vast numbers of mirrors and lenses under war contracts. It has the fine equipment and trained staff necessary for turning out work of the highest quality and of taking proper care of any valuable optical surfaces submitted. While at present their facilities are still devoted primarily to war contracts, they are now in a position to undertake aluminizing of telescope mirrors for amateurs. Also, lenses may now be coated with non-reflecting surfaces. Mirrors up to sixteen inches in diameter will be accepted.

The Research Laboratories of Duplate have, over the course of years, coated a number of surfaces for the Dunlap Observatory, both for our astronomical instruments and for equipment constructed for the Services. The work has been efficiently, promptly and courteously completed. Enquiries should be addressed to Research Laboratories, Duplate Canada, Ltd., Oshawa, Ontario.

F.S.H.

Isaac Barrow and Isaac Newton

There were three famous "Isaacs" living in England about 1670—the two named above and the author of *The Compleat Angler*. Isaac Barrow was distinguished as a mathematician, a classical scholar, a traveller and a theologian, but is perhaps best known for his resigning the chair of Lucasian Professor of Mathematics in order that his young pupil Isaac Newton might be appointed to it.

Recently a worthy memoir of Isaac Barrow has been published. The author is Percy H. Osmond, who shows an appreciation of the numerous accomplishments and the noble character of his subject. Our readers may be interested in two incidents in the book.

Barrow, when waiting at Court as royal chaplain, is credited with the following dialogue with the Earl of Rochester, "the ringleader of the Whitehall rakes":

Rochester: Doctor, I am yours to the shoe-tie.
Barrow: My Lord, I am yours to the ground.
Rochester: Doctor, I am yours to the centre of the earth.
Barrow: I am yours to the Antipodes.
Rochester (scorning to be foiled by a musty old piece of divinity): Doctor, I am yours to the lowest pit of Hell.
Barrow (turning on his heel): There, my Lord, I leave you.

Barrow is the author of a "divine ejaculation," as it has been called, written in Latin under the Platonic ὁ Θεὸς γεωμετρεῖ (God works as a geometer) on the fly-leaf of his copy of *Apollonius*, now one of the treasures of the Royal Society:

O Lord, how great a Geometer art Thou! For—although this science has no bounds, and infinite room is left for the discovery of new theorems, to the very limit of man's capacity—Thou hast in one glance seen all these things without any chain of deductions or irksome proofs. In other matters our intellect can achieve scarce anything and, like the fancy of the brute beasts, seems merely to indulge in vague dreams, out of which there spring almost as many opinions as there are men to hold them. But in Geometry there is universal agreement; and the human brain has succeeded here in achieving something—nay, something vast and wonderful; for that which in all other matters has proved wellnigh futile, in Geometry is capable, active, and successful. For this, then, I rejoice to love Thee. I look up to Thee and with deep yearnings long for the day when Thy goodness, Thine infinite all-holy loving-kindness, shall grant me to see with purified mind and undimmed sight, not only these, but far more and greater things, without this continuous toil of reasoning.

C.A.C.

A Brilliant Meteor in New Zealand

From Mr. H. Westoby of Guelph, Ont., comes an account of a remarkable meteor which was seen over a considerable portion of New Zealand. Its course was determined by Mr. R. A. McIntosh, who has made a number of valuable contributions on meteors to this Journal. Many interesting facts are contained in the following extract from the *Auckland Weekly News*:

Rarely does a celestial phenomenon attract such widespread attention as did the brilliant meteor which fell on the evening of December 30 last. It was

seen by hundreds of people from places as widely scattered as Whangarei in the north and Timaru in the south. Nearly 500 reports from observers have been examined and collated by Mr. R. A. McIntosh, director of the meteor section of the New Zealand Astronomical Society. From these reports Mr. McIntosh has been able to deduce a preliminary estimate of the meteor's actual path over the Dominion.

The meteor first became luminous at a height of 26 miles above Garnet Peak, which is 76 miles almost due north of Christchurch. It was then about equal in brightness to the evening star, the planet Venus. After it had travelled 18 miles a broad, luminous trail, rather like the vapour trail of an aeroplane, began to form in its wake. This trail, 130 miles in length, ended over Cook Strait, but the meteor continued over a total distance of 345 miles before disappearing.

Two Violent Explosions

Leaving the South Island over Cape Campbell, the meteor crossed to Palliser Bay. It was during this portion of its flight that it was first noticed by most people, when it had become twice as bright as Venus and noticeably lit up the observers' surroundings.

Two violent explosions occurred over the Wairarapa, large pieces breaking away from the nucleus and quickly fading as they fell behind. A further explosion, in which the nucleus was dissipated in a shower of sparks, took place at a height of 16 miles at a point on the east coast three miles north of Castlepoint. Only a dull red fragment remained to travel a further 108 miles into the Pacific, finally dying out only 12 miles above the sea level.

Observers in the Wellington, Wairarapa and Manawatu area all heard detonations arising from the rapid passage of the meteor through the atmosphere, occurring about two to four minutes after the flight of the meteor.

A Consoling Thought

The luminous trail formed behind the meteor hung in the sky for fully 20 minutes, during which time it was deformed by wind currents, first assuming the shape of the figure five and later that of the letter C.

Apart from the horizontal path of the meteor, the fact which most impressed observers was the slowness of its flight, which was more like that of an aeroplane than a meteor. The object was actually travelling at 11½ miles a second, which is near the minimum possible for a meteor overtaking the earth, and endured for fully 30 seconds, whereas those meteors which meet the earth in head-on collision endure for only a second or so and travel with velocities up to 44 miles a second. It is a consoling thought that, although meteorites can wreak appalling devastation, there is no authenticated case of anyone ever being killed by one.

C.A.C.

Retirement of G. A. Van Biesbroeck

Dr. George A. Van Biesbroeck of the Yerkes Observatory of the University of Chicago became professor emeritus of astronomy July 1, having reached the retiring age of 65. Dr. Van Biesbroeck was born in Belgium. Two comets have been named for him, and he holds the gold medal from the Academy of Sciences at Copenhagen, Denmark. He expects to continue to devote himself to his numerous researches and to travel as he has done for the past twelve years from Yerkes Observatory at Williams Bay, Wis., to the McDonald Observatory in western Texas, jointly operated by the University of Texas and the University of Chicago.

Although best known in the field of astronomy for his accurate measurements of double stars, he is the discoverer of the faintest stellar object known to astronomers, and of two comets. The stellar discovery referred to occurred last year at McDonald Observatory, when Professor Van Biesbroeck found on photographs a faint star which shared the apparent motion of a brighter star in the same part of the sky. The visual light of this star, revealed on photographs taken with the 82-inch McDonald Observatory reflector, is 500,000 times fainter than that of the sun.

Prof. Van Biesbroeck was an astronomer at the Brussels Observatory when the first world war broke out. After witnessing the invasion of Belgium, he accepted an invitation to come to Yerkes as a visiting professor in 1915. After a year in America, he returned to Holland and succeeded in getting his family across the Belgian border and to the United States by way of Scotland and the Orkneys, thus avoiding submarine dangers. The family was naturalized in 1922, and to-day his son is an ensign with the naval air forces in the southwest Pacific, and his daughter is a WAC in Italy.

Born in Ghent, Belgium, January 21, 1880, Prof. Van Biesbroeck was the son of a distinguished Belgian sculptor. His father's statue of the geographer and astronomer Mercator is said to have influenced the young Van Biesbroeck in the study of the physical sciences. After receiving an engineer's degree from the University of Ghent, he became a government engineer in the department of bridges and roads in Brussels, a post which he held from 1902 to 1908. His chief interest, however, was always in astronomy, and even while taking his engineering training he took a special degree in astronomy. For his

excellent work in the field, he was awarded a travelling fellowship which enabled him to spend two years in Germany, first in Heidelberg, where he engaged in astronomical observation under the astronomers Valentiner and Wolf, and then at the Potsdam Observatory under Hartmann and Müller. In 1908 he was appointed adjunct astronomer at the Royal Observatory, Uccle (near Brussels), Belgium.

Most of Prof. Van Biesbroeck's early work was devoted to the study of binaries of variable stars, and a detailed study of an annular eclipse of the sun which passed over Belgium in 1912.

His awards, in addition to the Danish gold medal presented him in 1910, include the Donohoe Comet Medal of the Astronomical Society of the Pacific in 1926 and 1935, and the Valz prize of the Paris Academy of Science. In 1935 the University of Brussels awarded him an honorary degree.

Because of his early training in engineering, Prof. Van Biesbroeck has always been interested in the design and construction of astronomical instruments. At the present time he is engaged in the design of a new spectograph for the study of infra-red radiations of the stars and nebulae. This spectograph is being constructed at Yerkes, but will be used in connection with the 82-inch reflector at McDonald.

C.A.C.

PERSONALS

G. M. Clemence has succeeded W. J. Eckert as director of the American Nautical Almanac Office, effective March 1, 1945. Mr. Clemence is a native of Rhode Island, was educated at Brown University, and has been on the staff of the U.S. Naval Observatory for the last 14 years.

H. H. Plaskett, M.A., F.R.S., Savilian Professor of Astronomy, Oxford University (son of the late John S. Plaskett), has been elected president of the Royal Astronomical Society.

C.A.C.

A GREAT READER

From a visitor's letter in the St. Petersburg (Florida) *Times* of January 26, 1945:

> To start with, I am a great reader and I bought papers at every station on my way south from Danville, Pa. I will say your *Times* is by far the newsiest.

C.A.C.

MEETINGS OF THE SOCIETY

AT TORONTO

April 11, 1944.—The Society met at 8.00 p.m. in the McLennan Laboratory, University of Toronto; Miss R. J. Northcott presiding.

Three persons were duly elected to membership in the Society, viz.:

Mr. Elmer A. F. Hill, 230 Bessborough Drive, Leaside.

Mr. S. D. Holmer, Ontario Department of Education, Toronto.

Mr. Fred W. Edwardes, 424 Deloraine Avenue, Toronto.

Miss Edna M. Fuller, Librarian at the David Dunlap Observatory, addressed the Society on "Telescopes the World Over," stressing particularly the international aspects of astronomical research in wartime and the difficulties under which astronomers are working at the present time.

The Union of Socialist Soviet Republics particularly was carrying on its astronomical work despite great handicaps and was making elaborate plans for the immediate post-war years. Of the 19 major observatories in Russia, nine had suffered total or partial destruction. These include those at Pulkova, Kiev, Odessa and Kharkov. In some cases, however, valuable libraries and much of the equipment had been removed to safety by the staffs and the astronomers were carrying on at other institutions outside the battle areas, some now being stationed at Tashkent in Soviet Asia. Even while the proposed site was in enemy hands, Soviet astronomers planned a new astrophysical observatory to be located in the Crimea with a 120-inch reflecting telescope at a mountain station, and a high-altitude observatory for solar work. A branch observatory, possibly in Africa, with an 80-inch telescope is also projected. To provide necessary personnel for these new institutions Russian universities have been requested to speed up training of students for astronomical work.

In France, construction work on the new observatory in Haute Provence has progressed during the war years. Not much news was coming through on astronomical work in Germany but reports reaching Harvard Observatory indicated that most of the major observatories were carrying on, but with depleted staffs. The speaker referred to rumours from Britain that the Royal Observatory at Greenwich might be moved to a new location after the war. This would do away with the handicap caused by London's smoke and lights which now interfere with effective work.

In the United States the first "formal" observatory, at Cincinnati, had just celebrated its centennial. The 200-inch telescope on Mount Palomar, California, the world's largest, was nearly ready to go into use as soon as wartime hazards were removed. In Mexico, astronomy was honoured by a series of postage stamps for the first time when in 1942 the new national observatory was dedicated at Tonanzintla. Five of the six stamps in the series are photographs of astronomical objects, the sixth a reproduction of the Russell diagram. The

31-inch Schmidt telescope at this observatory is the most powerful outside the temperate zones.

The speaker stressed the valuable work that amateurs with moderate telescopic equipment can do, particularly in the field of variable star observing. Thanks to the work of members of the American Association of Variable Star Observers and similar European groups, professional astronomers to-day can leave most of the work of recording magnitude changes in the brighter stars to the amateur.

Among telescopes used primarily for private or public enjoyment are those located at the five planetaria in the United States. These institutions were built as a result of philanthropic donations. Canada has no planetarium at present. It is hoped that means may be provided for one in Toronto and that the Society's headquarters may be in this building.

Following several questions from the audience on telescopes and observatories, and brief remarks by the Chairman on current astronomical events and phenomena, the meeting was adjourned. The members and guests then inspected a number of pictures of observatories and telescopes arranged on the lecture table and walls, and also a large map indicating the locations of the world's planetaria and the major observatories and telescopes around the globe.

FREDERIC L. TROYER, *Recorder.*

AT MONTREAL

January 25, 1945.—The Montreal Centre was privileged to hear an address by Dr. F. A. Paneth, Professor of Chemistry at the University of Durham, England, and presently with the National Research Council of Canada. Dr. Paneth's address was entitled "Meteorites and the Age of the Solar System", a subject on which he is well qualified to speak, having made valuable contributions to this field of scientific research.

Although the ancients apparently realized that meteorites fell from the sky, as evidenced by the fact that the Egyptian word for "iron" means "metal from the sky", it was not until after the shower of meteors near Paris in 1803 that the French Academy, representing the scientific world, formally acknowledged that meteorites did come from space.

Fortunately, it is not necessary to confine our study to meteorites which fall now, Dr. Paneth said, for we can recognize those which have already fallen. In the case of iron meteorites a very simple test is used. The meteorite is cut, polished and etched with dilute acid, whereupon a characteristic pattern of intersecting bands, known as Widmanstätten's figure, appears—a pattern which metallurgists have been unsuccessful in reproducing artificially on similar metals. Stone meteorites, on the other hand, are harder to recognize and must be chemically analysed.

Having acknowledged that meteorites come from the sky, one is still faced with the question "How do they get into the atmosphere?". To come from beyond the Solar System the meteorite must travel at a speed exceeding 42 kilo-

meters per second, thus indicating a parabolic or hyperbolic orbit. The only reliable calculation in support of this theory is that of Galle, derived from observations of the Pultusk stones which fell in Poland in 1868. Although some astronomers still hold to the "outside" theory, chemists and geologists are convinced that because of their chemical composition meteorites belong to the Solar System.

Turning to the question of the age of meteorites, Dr. Paneth went into the disintegration series of uranium, thorium and helium in some detail. The quantity of radioactive elements in meteorites is exceedingly small and difficult to measure, but having determined the amount present, one can calculate the time necessary to change uranium and thorium into helium. Realizing the importance of knowing whether a meteorite has retained all its helium, Dr. Paneth and his associates have made various heat tests, proving to their satisfaction that an iron meteorite does not lose any. By analysing six meteorites and applying the results of the analysis to fifty others, on the assumption that they were similar, it was found that the age in years, according to increasing helium values, ranged from 110 to 6800 million years, the age of the oldest meteorites being about four times as great as terrestrial rocks on the surface of the earth.

According to chemical and astronomical evidence meteorites are closely related to asteroids. As Dr. Paneth said, it would be difficult to draw any line of distinction between a very small asteroid and a very large meteor.

Dr. Paneth summed up his address with the three following statements. (1) Meteorites are members of the Solar System. (2) They are closely related to asteroids in both chemical and geological composition. (3) Their age indicates the age of the Solar System to be about 8,000 million years.

ISABEL K. WILLIAMSON, *Recording Secretary.*

February 22, 1945.—The Montreal Centre held a special meeting to commemorate the late Sir Arthur Eddington, whose death occurred in November, 1944. To this meeting were invited members of the McGill University Chapter of Sigma Xi. The memorial address, "The Life and Work of Sir Arthur Eddington", was given by Professor A. H. S. Gillson, of the Department of Mathematics, McGill University.

By way of introducing his subject to his audience, Prof. Gillson threw on the screen a photograph of Eddington taken twenty years ago. After giving a few biographical facts, Prof. Gillson said that "he would attempt to make clear the rather abstract work to which Eddington had devoted about forty years of his life." He placed particular emphasis on the courageous speculation of the man, his great mathematical mind and his equally great powers of concentration on observation.

Eddington's mathematical investigation of stellar motions, backing up Kapteyn's discovery that the stars in our galaxy are moving in two swarms or streams, led to the publication in 1914 of "Stellar Movements and the Structure of the Universe", a work which involved the examination of over six thousand catalogued stars. During the years of the first Great War he devoted himself to the study of the internal structure of stars, attacking this problem also from the

viewpoint of the mathematician, following up the clues supplied by Schwarzschild and the predictions of Maxwell, and introducing the important factor of radiation pressure. A third field of research to which Eddington made valuable contributions is that of relativity. Einstein's original paper on the subject was published in 1917. DeSitter amplified it and sent it on to Eddington who "swallowed it in his usual courageous manner", and became, in fact, Einstein's greatest exponent. He also upheld the expanding universe theory, his final paper on this subject being published in June, 1944.

Eddington had a fine command of the English language. His many books and treatises on the above mentioned subjects are remarkable, not only for their subject matter, but also for the beautiful manner in which they are written. As Prof. Gillson pointed out, most of them are of too technical and mathematical nature for the average reader, but he recommended especially to his audience "Stars and Atoms," published in August, 1926, for the ordinary public.

Professor Gillson also gave his audience an insight into the character and personality of the man. Eddington belonged to the Society of Friends, an influence which appears in all his works. Although opposed to physical violence of any sort, he was an intense fighter in the realm of thought. He frequently crossed swords with Sir James Jeans and we are told that people flocked to meetings of the Royal Astronomical Society in England to hear the heated debates between the two men. As he grew older he grew even more adventurous in expressing opinions which were often considered erratic and fantastic at the time. He was witty, kind and courageous, and possessed many friends as the obviously sincere tributes paid him at his death would indicate.

ISABEL K. WILLIAMSON, *Recording Secretary.*

MONTREAL CENTRE

February 8, 1945.—Mr. F. DeKinder gave the fourth lecture in the current popular series, his subject being "The Constellations". The ancient astronomers discovered that the stars retain the same relative positions, and for convenience in identifying or referring to specific areas of the celestial sphere, they divided the more conspicuous stars into groups or constellations. As the constellations still serve the same purpose, it is essential that anyone interested in astronomy become thoroughly familiar with them. Mr. DeKinder suggested that one begin as one would in a strange city, learning first the main streets or thoroughfares and then branching off into the less populated areas. With a series of fine slides, he pointed out the main constellations and the identifying features of each and showed how they in turn serve as guides to less conspicuous star groupings.

March 8, 1945.—The fifth lecture in the series, "Eclipses", was given by Mr. G. Harper Hall on this date. Mr. Hall first dealt with lunar and solar eclipses in general and then described the solar eclipse of August 31, 1932. Mr. Hall was among the fortunate few who actually saw this eclipse, and his vivid description, together with slides that he had taken at the time, left his audience with a feeling of regret that solar eclipses are so rare and that the path of

totality of the eclipse this July would be so far from Montreal. "From a purely spectacular point of view," said Mr. Hall, "a solar eclipse rivals anything man can witness on earth. The hush that prevails in nature, the marvellous colour effects, the shadow bands, the oncoming darkness, and finally the outbursting of the corona and prominences as the last ray of sunlight is cut off, leaves an impression on the human mind that can never be effaced."

April 12, 1945.—The final lecture in the series, scheduled for this date, was "Tools of the Astronomer", to be given by Dr. W. Bruce Ross, but owing to a sudden illness Dr. Ross could not attend and Mr. D. P. Gillmor, President of the Montreal Centre, stepped into the breach at a moment's notice and gave an excellent address on "Life in Other Worlds." Mr. Gillmor showed quite conclusively that life as we know it could not exist to-day in any part of our solar system except our earth, but that, considering the millions of galaxies, in all probability there were planets elsewhere in the universe with conditions suitable to support life.

May 10, 1945.—To conclude the popular series, a social evening, combined with a "Question and Answer" programme, was held on 10th May. Questions submitted during the season had been allotted to Council members prior to the meeting. These covered a wide range. The meaning of "Quo Ducit Urania" was explained by the President in a very entertaining manner. The perennial "Do Northern Lights make any sound?" was answered by Mr. G. Harper Hall who said hat as he himself had heard the aurora on several occasions, he had no alternative but to answer in the affirmative. Mr. D. E. Douglas, called upon to explain the terms "circle", "ellipse", "parabola" and "hyperbola", stole the show with his simple but effective demonstration of these four forms by means of a flashlight. Other questions included: "How were the craters on the Moon formed?", "Explain retrograde motion of a planet", "What is a Julian Day?", "Why are there tides on both sides of the earth at the same time?" and "How does the earth complete the full cycle of precession without the seasons being altered?"

Refreshments, provided by the lady members, were served during the "Question and Answer" period. This meeting, the first of its kind to be held by the Montreal Centre, was considered a successful innovation, for, with the increase in membership that has been experienced during the past few years, it was felt that members needed the opportunity to become better acquainted and to join in informal discussion.

ISABEL K. WILLIAMSON, *Recording Secretary.*

The Royal Astronomical Society of Canada

OFFICERS FOR 1945

Honorary President—THE HONOURABLE GEO. A. DREW, Premier and Minister of Education for the Province of Ontario
President—A. E. JOHNS, PH.D., Hamilton, Ont.
First Vice-President—H. BOYD BRYDON, Victoria, B.C.
Second Vice-President—J. W. CAMPBELL, PH.D., Edmonton, Alta.
General Secretary—E. J. A. KENNEDY, 198 College St., Toronto, Ont.
General Treasurer—J. H. HORNING, M.A., Toronto
Recorder—H. W. BARKER, Toronto *Librarian*—P. M. MILLMAN, PH.D., Toronto
General Council—C. S. BEALS, PH.D., Victoria; D. W. BEST, D.D., Toronto; G. E. CAMPBELL, M.A., Hamilton; W. G. COLGROVE, M.A., B.D., London; DELISLE GARNEAU, Montreal; HELEN S. HOGG, PH.D., Toronto; MGR. T. W. MORTON, Winnipeg; P. H. NADEAU, M.Sc., Quebec; ANDREW THOMSON, M.A., Toronto; G. M. VOLKOFF, PH.D., Vancouver; C. G. WATES, Edmonton; and Past Presidents—F. S. HOGG, PH.D., and A. VIBERT DOUGLAS, M.B.E., PH.D.; also the presiding officer of each Centre.

TORONTO CENTRE

Honorary Chairman—DR. C. A. CHANT *Chairman*—H. W. BARKER
Vice-Chairman—A. R. CLUTE, K.C.
Secretary—TRACY D. WARING, 44 Rosepark Drive, Toronto 12
Treasurer—T. H. MASON *Recorder*—FREDERIC L. TROYER *Curator*—R. S. DUNCAN
Council—D. S. AINSLIE, PH.D.; L. GILCHRIST, PH.D; REV. C. H. SHORTT; S/L. J. F. HEARD, PH.D.; S/L. P. M. MILLMAN, PH.D.; GEORGE T. DALE; H. DUNCALFE; MISS E. M. FULLER, B.L.S.; FRANK S. HOGG, PH.D.; and Past Chairmen—J. R. COLLINS, E. J. A. KENNEDY, S. C. BROWN, DR. D. W. BEST, MISS RUTH J. NORTHCOTT, M.A.

OTTAWA CENTRE

Honorary President—T. L. TANTON, PH.D. *President*—HOYES LLOYD, M.A.
First Vice-President—F/O. M. M. THOMSON, B.A.
Second Vice-President—R. J. MCDIARMID, PH.D.
Secretary—W. S. MCCLENAHAN, B.A., Dominion Observatory *Treasurer*—F. W. MATLEY
Council—MISS C. B. HICKS, B.A.; H. M. BRADLEY; R. G. MADILL, B.A.; A. H. MILLER, M.A.; C. B. REILLY, K.C.; and the three immediate Past Presidents—F. W. MATLEY; MISS M. S. BURLAND, B.A.; J. MCLEISH, B.A.

HAMILTON CENTRE

Honorary President—W. T. GODDARD, B.A.Sc. *President*—W. D. STEWART, B.A.
Vice-President—REV. E. F. MAUNSELL
Secretary-Treasurer—D. G. BURNS, 99 Wexford Ave. S. *Curator*—G. E. CAMPBELL, M.A.
Council—F. A. BUTCHER, B. A.; T. M. MORTON; DR. WM. FINDLAY; DR. A. E. JOHNS; W. S. MALLORY; F. S. SISMAN; F. SCHNEIDER; H. B. FOX; J. R. GRAHAM; and V. TAYLOR.

WINNIPEG CENTRE

Honorary President—RT. REV. T. W. MORTON *President*—L. T. S. NORRIS-ELYE
First Vice-President—MISS O. A. ARMSTRONG *Second Vice-President*—W. P. JOHNSON
Secretary—CHARLES G. CARD, 1197 Dominion St.
Treasurer—C. D. DORSETT *Press-Secretary*—L. W. KOSER
Council—R. D. COLQUETTE; L. J. CROCKER; V. C. JONES; MRS. J. NORRIS; H. E. RITER; R. A. STORCH; PROF. L. A. H. WARREN.

MONTREAL CENTRE

Honorary President—MGR. C. P. CHOQUETTE
President—D. P. GILLMOR, K.C. *Vice-President*—HENRY F. HALL
Secretary and Librarian—JOHN W. DUFFIE, 582 Mercille Ave., St. Lambert
Treasurer—F. J. DEKINDER *Chairman of the Telescope Committee*—DELISLE GARNEAU
Recorder—MISS ISABEL K. WILLIAMSON
Council—D. E. DOUGLAS; C. M. GOOD; J. E. GUIMONT; G. HARPER HALL; DR. D. A. KEYS; F. P. MORGAN; E. R. PATERSON; DR. W. B. ROSS; DR. A. N. SHAW.

VICTORIA CENTRE

Honorary President—LT. COMDR. R. M. PETRIE *President*—K. O. WRIGHT, PH.D.
First Vice-President—LT. COMDR. A. MCKELLAR *Second Vice-President*—W. R. HOBDAY
Secretary-Treasurer—MISS JEAN K. MCDONALD, B.Sc., 1025 McClure St.
Recorder—MRS. W. H. STILWELL, B.A. *Librarian*—MISS V. LANGWORTHY
Council—LT. CMDR. C. A. MCDONALD; MRS. J. R. NOBLE; LT. CMDR. A. SCAIFE; W. H. STILWELL; C. H. SUMMERS; DR. W. P. WALKER.

LONDON CENTRE

Honorary President—DR. H. R. KINGSTON
President—DR. R. H. COLE *Vice-President*—DR. A. J. WATT
Secretary-Treasurer—A. Emsley, 831 Richmond St.
Council—R. E. Winters; Mrs. A. Emsley; Dr. G. W. Hofferd; W. E. Shales; Dr. A. J. Watt.

VANCOUVER CENTRE

Honorary President—DR. G. M. SHRUM *President*—N. D. B. PHILLIPS
Vice-President—H. D. SMITH, PH.D. *Secretary*—N. BARTON, M.A., 4691 W. 11th Ave.
Recorder—WM. PETRIE, PH.D. *Treasurer*—F. G. BERTON
Council—MRS. L. ANDERSON; B. CATTERALL; G. T. GILPIN; J.G. HOOLEY, PH.D.; C. JORGENSEN; MISS GLADYS W. OWEN.

EDMONTON CENTRE

Honorary President—J. W. CAMPBELL, PH.D. *President*—A. J. COOK

(Continued at bottom of next page)

THE ROYAL ASTRONOMICAL SOCIETY OF CANADA
1890-1945

The Society was incorporated in 1890 under the name of The Astronomical and Physical Society of Toronto, and assumed its present name in 1903.

For many years the Toronto organization existed alone, but now the Society is national in extent, having active Centres in Montreal and Quebec, P.Q.; Ottawa, Toronto, Hamilton, London and Windsor, Ontario; Winnipeg, Man.; Edmonton, Alta.; Vancouver and Victoria, B.C. As well as about 950 members of these Canadian Centres, there are over 200 members not attached to any Centre, mostly resident in other nations, while some 300 additional institutions or persons are on the regular mailing list for our publications.

The Society publishes a monthly "Journal" containing about 500 pages and a yearly "Observer's Handbook" of 80 pages. Single copies of the "Journal" or "Handbook" are 25 cents, postpaid. In quantities of 10 or more copies, the price is 20 cents a copy.

Membership is open to anyone interested in astronomy. Annual dues, $2.00; life membership, $25.00. Publications are sent free to all members or may be subscribed for separately. Applications for membership or publications may be made to the General Secretary, 198 College St., Toronto.

The Society has for Sale:

Reprinted from the "Journal" of the Royal Astronomical Society, 1936-1944.

The Physical State of the Upper Atmosphere, (revised 1941) by B. Haurwitz, 96 pages; Price 75 cents postpaid.

General Instruction for Meteor Observing, (revised 1940) by Peter M. Millman, 24 pages; Price 15 cents postpaid.

The Visual Photometry of Variable Stars, by H. Boyd Brydon, 64 pages; Price 50 cents postpaid.

A Yoke Mounting for the Six-inch Telescope, by H. Boyd Brydon, 8 pages; Price 10 cents postpaid.

Setting Up and Adjusting the Equatorial Reflecting Telescope, by H. Boyd Brydon, 25 pages; Price 25 cents postpaid.

Occultations: their Prediction, Observation and Reduction, by H. Boyd Brydon, 76 pages, 1944; Price 60 cents.

In quantities of ten or more copies, a discount of 20 per cent will be allowed. Send Money Order to 198 College St., Toronto.

(Continued from previous page)

Secretary—E. H. Gowan, Ph.D., University of Alberta *Treasurer*—Miss A. M. P. Smith
Librarian—E. S. Keeping *Social Hostess*—Miss A. Malanchuk
Council—F. C. Blower; S. G. Deans; G. W. Robertson; D. B. Scott; C. G. Wates.

CENTRE DE QUEBEC

Président Honoraire—Arthur Amos, I.C. *Président*—Jean-Chs Magnan, B.S.A.
Vice-Président—Lucien Pouliot, C.G.A.
Secretaire—Paul-H. Nadeau, M.Sc., 275 rue St-Cyrille *Trésorier*—Lionel Gallichan
Membres du Conseil—L'abbe Emilien Gauthier; L'abbe Rosario Benoit; Lionel Lemieux, B.A., LL.L.; Henri-Paul Koenig, M.Sc.; Marie-Louis Carrier, L.C.; Alberic Boivin, E.E. Phy.; Geo-Etienne Gagne.

WINDSOR CENTRE

President—C. H. Montrose, B.Sc. *Past-President*—Lorne R. Rogers, B.A.
Vice-President—Gregory Rawlings, B.A. *Treasurer*—Cyril B. Hallam, B.A.
Secretary—D. C. Bawtenheimer, 1923 Iroquois St., Windsor
Council—C. A. Bell, B.A.; E. J. Edwards; J. Evzovitch, B.S.E.E.; Emerson Forden; W. Almon Hare, B.A.Sc.; W. J. Person; W. A. Roberson; G. F. Spracklin; Russell Warwick, B.A.